



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**  
Region III  
LISLE, ILLINOIS 60532

May 4, 2004

MEMORANDUM TO: Eric Duncan, Chief  
Projects Branch 6  
Division of Reactor Projects

FROM: Anton Vogel, Chief */RA/*  
System Engineering Branch  
Division of Reactor Safety

SUBJECT: D. C. COOK NUCLEAR POWER PLANT  
DRS INPUT TO INTEGRATED REPORT 05000315/2004006;  
05000316/2004006

Attached is the report input for D. C. Cook Nuclear Power Plant, Inspection Report 05000315/2004006; 05000316/2004006. I have reviewed this input and have determined it is ready for distribution to the licensee and dissemination to the public.

Attachment: Input to Inspection Report 05000315/2004006;  
05000316/2004006

CONTACT: Patricia Loughheed, DRS  
(630) 829-9760

DOCUMENT NAME: C:\ORPCheckout\FileNET\ML041250478.wpd

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## Cover Letter

X Green finding was identified. Include the following:

Based on the results of this inspection, one NRC-identified finding of very low safety significance, which involved a violation of NRC requirements was identified. However, because this violation was of very low safety significance and because the issue was entered into the licensee's corrective program, the NRC is treating this finding and issue as a Non-Cited Violation in accordance with Section VI.A.1 of the NRC's Enforcement Policy. Additionally, a licensee-identified violation is listed in Section 4OA7 of this report.

## Title Page

Inspector: P. Loughheed, Senior Engineering Inspector, DRS  
C. Acosta, Nuclear Safety Intern, DRS

## SUMMARY OF FINDINGS

ADAMS boilerplate - Inspectable area: Heat Sink

Modify as follows:

IR 05000315/2004006, 05000316/2004006; 04/12/2004 – 04/14/2004; D.C. Cook  
Nuclear Power Plant, Units 1 and 2; Other Activities.

This report covers a 3-month period of baseline resident inspection and an announced inspection following up on unresolved items from the last baseline heat sink performance inspection. The inspection was conducted by the resident inspectors and Region III specialist inspectors. One Green finding associated with one Non-Cited Violation was identified. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP). Findings for which the SDP does not apply may be "Green" or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 3, dated July 2000.

### A. Inspector-Identified and Self-Revealed Findings

#### Cornerstone: Mitigating Systems

- Green. A finding of very low safety significance was identified by the inspectors for a Non-Cited Violation of 10 CFR Part 50, Appendix B, Criterion XI, for the failure to include adequate acceptance limits in the procedure for inspecting and cleaning the component cooling water heat exchangers. Corrective actions by the licensee included revising the acceptance limits to better define what constituted a blocked heat exchanger tube.

This finding was more than minor because if left uncorrected this issue could become a more significant safety concern. Specifically, the testing acceptance limit deficiencies could have designated a component cooling water heat exchanger as acceptable, when the heat exchanger had actually degraded below its design requirements. The issue was of very low safety significance because the licensee had cleaned all four component cooling water heat exchangers in May 2003. (Section 4OA5)

## **B. Licensee-Identified Findings**

Violations of very low safety significance, which were identified by the licensee have been reviewed by the inspectors. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program. These violations and the licensee's corrective action tracking numbers are listed in Section 4OA7 of this report.

## **REPORT DETAILS**

### **4. OTHER ACTIVITIES**

#### **4OA5 Other Activities**

- .1 (Closed) Unresolved Item 05000315/2003002-01; 05000316/2003002-01: "Essential Service Water (ESW) System Water Hammer Load Calculation Concern." This unresolved item was opened to document a number of inspector concerns with the licensee's evaluation of a hydraulic transient which occurred in 2000 following a dual unit loss of offsite power. In order to evaluate the issue, and the licensee's actions, the inspectors reviewed licensee documents, interviewed personnel, and performed a walkdown of the ESW system, specifically looking for signs of piping movement. The licensee had previously determined that the ESW system would be subject to column-rejoining hydraulic transients under certain conditions which were within the design basis. Following the 2000 event, the licensee had walked down the system and had performed an operability evaluation, which concluded that although some stresses appeared to be above the B31.1 Code allowables, the calculation contained sufficient conservatism to conclude that the piping was not overstressed. The licensee had a corrective action in place to perform a design basis calculation of the system. During the walkdown, the inspectors identified some indications of previous pipe movement, such as damaged insulation and unpainted segments of pipe. Based on the relative flexibility of the system, a licensee examination of the weld surface of one hanger, and the licensee's planned action to perform a design basis calculation, the inspectors concluded there was no operability concerns associated with these indications. Because this issue was identified by the licensee and was captured in condition report P-00-10960 and the corrective actions planned or taken were appropriate, the inspectors determined that the licensee should be given credit for identifying the violation (see Section 4OA7). The unresolved item is closed.
- .2 (Closed) Unresolved Item 05000315/2003002-02; 05000316/2003002-02: "Estimation of Tube Blockage in the Component Cooling Water Heat Exchangers." This unresolved item was opened to document a concern with how the licensee was determining the as-found acceptability of heat exchangers. Specifically, the test method chosen by the

licensee to demonstrate that safety-related heat exchangers will perform satisfactorily in service is opening and inspecting the heat exchanger tubes for blockage. Prior to 2001, the licensee procedures accepted tubes as not being blocked if they were capable of being cleaned with 105 pound per square inch gauge (psig) air. In 2001, during the safety system and performance capability inspection, the NRC questioned the acceptability of this value. As a result of the question, the licensee reduced the value to 65 psig. In 2003, during the heat sink inspection, the inspector again questioned the value. At that time, the licensee enlisted design engineering support and determined the maximum pressure to be used was 5 psig. During this inspection, the inspectors reviewed the licensee's actions and performed independent calculations which determined that blowing 5 psig air through the tubes was less than the pressure drop experienced during normal operation. Therefore, the inspectors concluded the use of 5 psig air to determine if a tube was blocked was acceptable. The inspectors determined that use of a non-conservative acceptance criteria was a performance deficiency which could have been identified by the licensee. The finding was greater than minor because the non-conservative acceptance criteria could have resulted in the licensee concluding that a heat exchanger was capable of performing its mitigating system function when it actually was not. The inspectors determined that the finding was only of very low safety significance because the heat exchangers had been cleaned in 2003 such that the as-left condition of the heat exchangers was acceptable. 10 CFR Part 50, Appendix B, Criterion XI, "Test Control," requires, in part, that a test program be established to demonstrate that components will perform satisfactorily in service and that the tests be performed in accordance with written procedures which incorporate acceptance limits contained in applicable design documents. The use of a non-conservative value for determining heat exchanger tube blockage was an NRC identified violation of 10 CFR Part 50, Appendix B, Criterion XI. The licensee entered this issue in its corrective action program as condition reports 01282046 and 03083036. Because this violation was of very low safety significance and because it was entered into the licensee's corrective action program, this violation is being treated as a Non-Cited Violation (NCV), consistent with Section VI.A of the NRC Enforcement Policy (NCV 05000315/2004006-0x; 05000316/2004006-0x). The unresolved item is closed.

- .3 (Closed) Unresolved Item 05000315/2003002-03; 05000316/2003002-03:  
"Questionable Data Regarding Component Cooling Water (CCW) Heat Exchanger As-Built Specification Sheet." This unresolved item was opened to document a concern regarding the reasonableness of a licensee calculation involving the outside heat transfer coefficient correction factor. There was also a concern that the original manufacturer's specification sheet might have overestimated the CCW heat exchangers' heat transfer capabilities and, therefore, the impact on their ability to perform their safety function. During the inspection, the inspectors performed independent calculations of these heat transfer parameters and agreed that the outside heat transfer coefficient correction factor was lower than the one calculated by the licensee; however, the inspectors concluded that the original manufacturer's specification sheet was accurate. The issue was minor because the licensee did not use the calculation to determine heat exchanger acceptability. Instead, the licensee opened, inspected, and cleaned the heat exchangers each refueling outage. The inspectors determined that the heat exchangers had been cleaned in 2003 and that the as-left condition of the heat exchangers was acceptable. No violations of NRC requirements were identified. This item is closed.

#### 4OA6 Meetings

##### .2 Interim Exit Meetings

Interim exit meeting was conducted for:

- Evaluation of Heat Sink Unresolved Items with Mr. J. Jensen on April 14, 2004.

#### 4OA7 Licensee-Identified Violations

As discussed in Section 4OA5.1, the following violation of very low significance was identified by the licensee and is a violation of NRC requirements which meets the criteria of Section VI of the NRC Enforcement Manual, NUREG-1600, for being dispositioned as an NCV:

##### **Cornerstone: Mitigating Systems**

Title 10 CFR Part 50, Appendix B, Criterion III, "Design Control," requires, in part, that applicable regulatory requirements and the design basis are correctly translated into specifications, drawings, procedures, and instructions. The failure to correctly translate the design loads on the ESW piping system into specifications which showed that Code allowables were not exceeded is a violation of 10 CFR Part 50, Appendix B, Criterion III. It is of very low safety significance because there was sufficient conservatism in the operability evaluation to show that the system remained operable. This issue was identified by the licensee and captured in condition report P-00-10960. Corrective actions taken or planned included verification that loads are within the ASME Code allowables.

### **KEY POINTS OF CONTACT**

#### Licensee

D. Fadel, Engineering Vice President  
J. Jensen, Site Vice President  
C. Lane, Engineering Programs Supervisor  
J. Newmiller, Compliance Specialist  
T. Noonan, Plant Engineering Director  
T. Woods, Compliance Supervisor

### **LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED**

#### Opened

05000315/2004006-XX; 05000316/2004006-XX	NCV	Inadequate Acceptance Criteria for Heat Exchanger Tube Blockage
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#### Closed

05000315/2003002-01; 05000316/2003002-01	URI	Essential Service Water (ESW) System Water Hammer Load Calculation Concern
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05000315/2003002-02; 05000316/2003002-02	URI	Estimation of Tube Blockage in the Component Cooling Water Heat Exchangers
05000315/2003002-03; 05000316/2003002-03	URI	Questionable Data Regarding Component Cooling Water Heat Exchanger As-Built Specification Sheet
05000315/2004006-XX; 05000316/2004006-XX	NCV	Inadequate Acceptance Criteria for Heat Exchanger Tube Blockage

## **LIST OF DOCUMENTS REVIEWED**

### **4OA5 Other Activities**

CR P-00-10960; Lifting of Unit 2 West Containment Spray Heat Exchanger Safety Valve; dated August 6, 2000

CR 01282046; NRC Questioned Conduction of Generic Letter 89-13 As-found Inspections in Reference to Functionality During Previous Operating Period; dated October 10, 2001

CR 01046029; Ineffective Evaluation of Past Condition Involving Integrity of the Component Cooling Water Heat Exchanger Baffle Plates; dated February 16, 2001

CR 03126016; Channel Cover (Dollar Plate) Pass Partition Groove on Unit 1 West Component Cooling Water Heat Exchanger Deteriorated; dated May 7, 2003

CR 03083036; NRC Questioned Approach for Assessing the As-found Condition of Generic Letter 89-13 Heat Exchangers; dated March 25, 2003

CR 03124006; Divider Plate on U1 West Component Cooling Water Heat Exchanger Found Tore Away; dated May 3, 2003

CR 04076006; Unresolved Items Opened in NRC Inspection Report; dated March 16, 2004

CR 04106040; Organizational Ineffectiveness Allowed Incomplete Corrective Action to Go Undetected; dated April 15, 2004\*

CR 0410739; Essential Service Water Pipe Support Has One of Four Bolts Not Perpendicular to Wall; dated April 16, 2004\*

1-ESW-43; Essential Service Water Isometric Auxiliary Building Elevation 628'-3"; Revision 12

1-ESW-44; Essential Service Water Isometric Auxiliary Building Elevation 620'-3"; Revision 10

1-ESW-64; Essential Service Water Isometric Auxiliary Building Elevation 643'-0"; Revision 9

2-ESW-53; Essential Service Water Isometric Auxiliary Building Elevation 628'-3";  
Revision 13

2-ESW-58; Essential Service Water Isometric Auxiliary Building Elevation 616'-7";  
Revision 8

1-GESW-R23; Hanger Detail Drawing; Revision 6

1-GESW-R24; Hanger Detail Drawing; Revision 7

1-GESW-R63; Hanger Detail Drawing; Revision 6

1-GESW-V16; Hanger Detail Drawing; Revision 6

2-GESW-R31; Hanger Detail Drawing; Revision 8

2-GESW-R32; Hanger Detail Drawing; Revision 5

2-GESW-V6; Hanger Detail Drawing; Revision 5

31760; ML Worthington Heat Exchanger Specification Sheet; dated September 5, 1972

EH1-8913; Program for Implementing Generic Letter 89-13 (Service Water System  
Reliability); Revision 3

MDS-607; Heat Exchanger Tube Plugging; Revision 5

TS-O-3020; Perform Generic Letter 89-13 Program Field Inspection; Revision 0

12-MHP-5030-016-001; Component Cooling Water Heat Exchanger Inspection,  
Cleaning and Tube Plugging; Revision 5

12-MHP-5030-016-002; Emergency Diesel Generator Engine Jacket Water and Lube  
Oil Heat Exchanger Disassembly, Inspection, Cleaning, Tube Plugging and Assembly;  
Revision 4

WO R0227595; Unit 2 East Component Cooling Water Heat Exchanger: Open, Inspect,  
Clean and Close Heat Exchanger; dated May 31, 2003

WO R0227597; Unit 2 West Component Cooling Water Heat Exchanger: Open,  
Inspect, Clean and Close Heat Exchanger; dated May 27, 2003

WO R0244993; Unit 1 West Component Cooling Water Heat Exchanger: Open,  
Inspect, Clean and Close Heat Exchanger; dated November 1, 2003

WO R0245571; Unit 1 East Component Cooling Water Heat Exchanger: Open, Inspect,  
Clean and Close Heat Exchanger; dated November 8, 2003

\*Condition report written as result of NRC inspection

## **LIST OF ACRONYMS USED**

CCW	Component Cooling Water
CR	Condition Report
ESW	Essential Service Water
IMC	Inspection Manual Chapter 0609, "Significance Determination Process"
NCV	Non-Cited Violation
NRC	United States Nuclear Regulatory Commission
psig	Pounds per Square Inch, Gauge
SDP	Significance Determination Process
URI	Unresolved Item
WO	Work Order